Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of the Commission 's Rules to	)	ET Docket No. 96-102
Provide for Unlicensed NII/SUPERNet	)	RM-8648
Operations in the 5 GHz Frequency Range	)	RM-8653
	)	

Comments Of The Benton Foundation And Computer Professionals For Social Responsibility

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I. Introduction

The Benton Foundation ("Benton") believes that communications in the public interest, including the effort to connect all Americans to basic communications systems, is essential to a strong democracy. Benton's mission is to realize the social benefits made possible by the public interest use of communications. Benton bridges the worlds of philanthropy, community practice, and public policy. It develops and provides effective information and communication tools and strategies to equip and engage individuals and organizations in the emerging digital communications environment.

Benton's Communications Policy Project is a nonpartisan initiative to strengthen public interest efforts in shaping the emerging National Information Infrastructure ("NII"). It is Benton's conviction that the vigorous participation of the nonprofit sector in policy debates, regulatory processes and demonstration projects will help realize the public interest potential of the NII. Current emphases of Benton's research include extending universal service in the digital age; the future of public service in the new media environment; the implications of new networking tools for civic participation and public dialogue; the roles of states as laboratories for policy development; and the ways in which noncommercial applications and services are being developed through new telecommunications and information tools. (See Benton's World Wide Web Page at http://www.benton.org/).

Computer Professionals for Social Responsibility ("CPSR") is a public-interest alliance of computer scientists and others concerned about the impact of computer technology on society. CPSR works to influence decisions regarding the development and use of computers because those decisions have far-reaching consequences and reflect our basic values and priorities. As technical experts, CPSR members provide the public and policy makers with realistic assessments of the power, promise, and limitations of computer technology. As concerned citizens, CPSR directs public attention to critical choices concerning the applications of computing and how those choices affect society. (See CPSR's World Wide Web page at http://www.cpsr.org/).

The commenters are supportive of the *suggested* potential of the NII/SUPERNet proposal. As we move forward into the new age of telecommunications, there is an increased concern that vital segments of our nation are being left without access to information. Schools, libraries, medical institutions, non-profit organizations, and remote communities need access to the NII to ensure that its reach is universal. Children raised in today's society without access to information technology and digital information resources are at a great disadvantage. Giving them access gives them connections to libraries, institutions, governments, and resources around the world and on every subject. The benefits, both economically and socially, of connecting all Americans to the

emerging NII are clear. From improved education, to enhanced access to health care services, to better paying jobs, the NII offers much promise. We cannot permit our youth to miss out on these connections. Likewise, we should not permit remote communities to fall behind in access to these resources. By connecting all segments of society to the NII, we also give all segments a greater voice, rejuvenating our participatory democratic society.[1]

But access can be an expensive burden. The NII/SUPERNet proposal has been presented as one of the solutions to this problem.[2] The hard-wiring of schools with computer networks can

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[1] The recent court decision enjoining enforcement of the Communications Decency Act as unconstitutional found the Internet to be of immense value to our democracy.

> It is no exaggeration to conclude that the Internet has achieved, and continues to achieve, the most participatory marketplace of mass speech that this country -- and indeed the world -- has yet seen. The plaintiffs in these actions correctly described the "democratizing" effects of Internet communication: individual citizens of limited means can speak to a worldwide audience on issues of concern to them. Federalists and Anti-Federalists may debate the structure of their government nightly, but these debates occur in newsgroups or chat rooms rather than pamphlets. Modern-day Luthers still post their theses, but to electronic bulletin boards rather than the door of the Wittenberg Schlosskirche . . . The Internet may fairly be regarded as a never-ending worldwide conversation. The Government may not, through the CDA, interrupt that conversation As the most participatory form of mass speech yet developed, the Internet deserves the highest protection from government intrusion.

American Civil Liberties Union v. Reno, No. 96-963, 171-79 (E.D.Pa June 11, 1996) (unpublished) (Dalzell, J, concurring).

[2] *In the Matter of Amendment of the Commission's Rules to Provide for Unlicensed NII/SUPERNet Operations in the 5 GHz Frequency Range*, Notice of Proposed Rulemaking ET Docket No. 96-102, RM-8648, RM-8653 ¶ 33 (May 6, 1996); *In the Matter of Allocation of Spectrum in the 5 GHz Band to Establish a Wireless Component of the National Information Infrastructure, Comments of Apple Computer, Inc,* § I. RM-8653, RM-8648 (July 25, 1996); *In the Matter of Allocation of Spectrum in the 5 GHz Band to Establish a Wireless Component of the National Information Infrastructure, [Apple Computer's] Petition for Rulemaking: "NII Band"* § Summary RM-8653 (May 24, 1995) ("The NII Band would advance a host of public policy objectives, including assuring that all segments of society have access to the "information superhighway;" extending advanced telecommunications offerings to schools, libraries, hospitals, and government agencies; and promoting the participation of small businesses, businesses owned by women or minorities, and pioneering firms in tomorrow's telecommunications marketplace."). Reed Hundt also has indicated his view that the SUPERNet proposal is a solution for providing access to schools and other isolated segments of American society.

> We will see high-speed voice, video and data transfer. This is acutely important to schools. Some of the oldest buildings in the country are school buildings and we don't have the money in this country, or at least we haven't decided to spend the money in this country to rebuild these schools.
>
> So there's a tremendous burden in building networks into the schools which is that the walls are hard to get through. It's as simple as that. And in many cases the schools are built with asbestos material that's sealed, and so there are extra costs involved in any construction project.
>
> The goal here is to let our industries figure out how to invent wireless local area networks that can connect classrooms within schools, within campuses, that could connect health care facilities that are in many different buildings without having to tear down or drill through the walls. This is an immensely

be a mutli-million dollar venture.[3] The hardware is expensive. The installation is difficult. Environmental concerns such as asbestos-laden walls deter projects. NII/SUPERNet could be an inexpensive alternative. Benton and CPSR support this vision of NII/SUPERNet. We are concerned, however, that this vision of NII/SUPERNet be maintained. If the justification for setting aside valuable spectrum is to provide access to the NII for communities and public institutions that are not able to afford it now, then the rules which are issued must be structured to ensure this rationale is not lost.

Benton and CPSR cannot support the spectrum allocations outlined in this proceeding because of the concerns discussed below. Despite the importance of creating higher power shared-spectrum radio rules to connect isolated communities, we find that Apple Computer ("Apple") has failed to provide sufficient technical justifications for sharing spectrum without interference with either existing services in the proposed bands, or their own radios once any significant deployment is made in the same area. Also we are not convinced that the WINForum proposal is aimed at

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important goal that potentially could save billions of dollars for the country.

We have been mandated here at the FCC to make sure that every classroom is connected to the Information Highway. We are ordered under the law to make sure that advanced telecommunications services are affordable to everyone in the country, especially including kids in classrooms. But we don't want to say that these goals will only be met by yesterday's technology, we want to say that it's important to use tomorrow's technologies to meet these goals."

FCC Proposes Spectrum For Broadband Unlicensed Wireless Devices: Remarks of Chairman Reed Hundt http://home.navisoft.com/nspi/n2.html (accessed June 11, 1996). *See also FCC Proposes Spectrum For Broadband Unlicensed Wireless Devices: Remarks of Commissioner Susan Ness* http://home.navisoft.com/nspi/n2.html (accessed June 11, 1996) ("Especially enticing are the prospects for wireless local area networks to connect classroom computers to each other -- and to the world beyond"); *In Re Wireless Information Networks Forum Petitioner for Rulemaking to Allocation the 5.1-5.35 GHz Band and Adopt Service Rules for a Shared Unlicensed Personal Radio Network*, RM 8648, 8683, Comments of Wireless Information Networks Forum (July 10, 1995) ("The fundamental principle underlying both the WINForum and Apple Petitions is that the vast wealth of electronic media stored on the internet and other resources of the National Information Infrastructure must be available on a simple, convenient, and low cost basis for all Americans."); *In Re Wireless Information Networks Forum Petition,* Comments of Microsoft Corporation, RM-8653 § I.B. (F.C.C. July 10, 1995); E-Mail from David Hughes to inet-access@earth.com (Jun 14, 1996) (arguing that SUPERNet proposal will greatly reduce cost of providing NII access to schools).

[3] *See In the Matter of Allocation of Spectrum in the 5 GHz Band to Establish a Wireless Component of the National Information Infrastructure*, Comments of Apple Computer, Inc. § I.D. RM-8653, RM-8648 (July 10, 1996) (estimating cost of hard wiring school as high as $30 billion).

schools and public libraries or that it will serve them enough to justify this allocation. The proposal offers a solution for no problems as it fails to meet the proponents' and the Commission's objectives.

II. Technical Difficulties Prevent the Proposed Uses Of NII/SUPERNet Spectrum

The NPRM proposes setting aside 350 Mhz of the spectrum in the 5 GHz range for NII/SUPERNet. This spectrum will be used for indoor networks; the Commission invites comments on the possibility of using this spectrum for outdoor NII/SUPERNet networks as well. Indoor networks would operate with a transmission strength of 1/10 watt. The Commission estimates a transmission range of 50 to 100 meters; others estimate transmission ranges that are significantly lower, perhaps 10 to 25 meters. There are also concerns about signal propagation. Transmissions in the 5 Ghz range at this strength will have low propagation; there will be a significant reduction in signal as it passes through walls. Some have suggested that, in order to have a signal transmitted throughout an entire building (for example, a school building), some means of repeating the signal will be necessary. One possibility presented would be to run bleeder lines throughout buildings.

Indoor wireless networks are often mentioned as alternatives to wired networks. This is in part based on the reduction of expense of installing a wireless network.[4] Those supporting this proposition should be required to produce a study or other evidence in support of this claim. The savings are supposed to come from not wiring a building (for example a school) and avoiding breaking through asbestos laden walls. But 1/10 power transmissions in the 5 GHz range has limited range and propagation. A transmission may have trouble making it across a room. It does not appear that it would make it to a second room. Therefore, some method of carrying the signal

[4] NPRM at 33.

throughout the building is required, such as bleeder lines.[5] In the end, a SUPERNet network will require a server capable of managing all of the radio transmissions, an ability to carry the signal throughout the building (possibly repeaters or bleeder lines), units on each computer capable of connecting to the network, and installation. The price tag could be substantial. Proponents should be required to establish that this is a viable replacement to wired systems.

There are also existing, alternative wireless systems such as infrared communications. Is SUPERNet truly superior to infrared and other existing systems? Proponents should be required to establish that this spectrum allocation would not be duplicative of existing wireless communications.

The Commission has characterized outdoor networks as high power networks. Some disagree with this characterization. Apple disagrees with this characterization. Apple indicates that similar to indoor networks, outdoor networks would use 1/10 watt power transmissions. The distinction is that outdoor networks would use narrow beam, point-to-point, line of sight transmissions. Antennas would utilize dishes to increase gain. Using this method of transmission, Apple indicates that sufficient distance can be achieve for transmissions. The NPRM estimates a transmission range of 10 - 15 kilometers.

This narrow beam transmission can avoid problems of interference. The potential for interference only needs to be examined in the path of the narrow-beam; other users of this range of spectrum can be avoided and routed around. The utility of such a spectrum allocation will be limited where usage congestion exceeds the capacity of the spectrum. In other words, the Apple proposal may have reduced utility in population dense urban environments where the number of users would crash the system. Furthermore, this proposal will not work where line of sight transmissions cannot be achieved. Thus the utility of this proposal in anything other than relatively flat terrain appears limited. Again, since the transmission range is limited, the utility is reduced

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[5] Apple has indicated that environmental concerns eliminate the possibility of simply increasing the transmission power as an answer to the weakness of the signal.

where the population is not close enough together. Areas of low population density would have to invest heavily in repeaters or not use the system. So where does this system work well? Not urban. Not mountainous. Not deep country. The proponents of this system should be required to produce a study or evidence in support of the proposition that outdoor networks have anything more than a very limited utility.[6]

Apple, Winforum, and others have presented NII/SUPERNet as a powerful solution to problems of universal service. Yet the technical difficulties of this proposal may indicate that NII/SUPERNet may not in fact meet those goals. The Commission should be provided with proof that this proposal can work and that it can work for the purpose presented. The zeal of American industry to profit from the wireless market should not blind the Commission to the possible technical deficiencies of NII/SUPERNet and its possible inability to deliver on its promises.

The comments of the Connectivity for Learning Coalition ("Coalition") in this proceeding cast even more doubt on the usefulness of this proposal, as it stands, for schools and libraries. The comments of the coalition detail how the Commission's proposal will fall short of meeting the needs of the education and libraries communities.

III. Setting Spectrum "Etiquette" for NII/SUPERNet Should Encourage Quick Rollout of Devices and Allow for Rapid Advancement of Technology

The Commission seeks comment on spectrum sharing protocol and "etiquette." The Commission's goal in setting these protocols, standards or etiquette should be two-fold: to encourage quick rollout of NII/SUPERNet devices and to allow for rapid advancement of these technologies. The process of creating standards for the unlicensed PCS band should serve as an

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[6] We note that there are other alternative plans for providing access to the NII for schools. The National Cable Television Association recently announced a plan to "provide 3,000 schools in roughly 64 communities with [cable] Internet connections." *Free Internet Plan For Schools,* ASSOCIATED PRESS (July 9, 1996); *Cable TV Firms to Link Schools to the Internet,* THE WASHINGTON POST D1 (July 9, 1996). *See also* Netday96 http://netday96.com/ (volunteer effort to provide wire schools for Internet connection).

example of the worst case scenario: industry players writing extensive standards that delay the development of the technology and fail to use the spectrum for its intended use. The Commission should set minimal standards as it has for other Part 15 devices and not invest too much time or resources developing "paper" standards that may or may not work in the real world.

If, however, the Commission sets out to create more extensive standards, it should not rely on working groups that draw their membership entirely from industry. These groups should include members from the public interest sector, without commercial interests, that will serve to raise public interest concerns in the creation of the standard[7].

IV. Conclusion

The spectrum which the NPRM proposes to set aside is valuable. The purpose for setting aside the spectrum is likewise great. The NII/SUPERNet proposal promises to make a valuable contribution to connecting all Americans to the National Information Infrastructure. This will help to empower all segments of our society and enrichen our participatory democracy. We should be careful to make sure that NII/SUPERNet fulfills this promise. This vision should be the number one priority for NII/SUPERNet. The Commission should be assured that this vision can be fulfilled, that NII/SUPERNet can create computer network links which in fact provide access for information to those with limited access to the NII. The value of the spectrum is too high and the need of schools and remote communities is too great to permit this spectrum allocation to be misused.

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[7] Both Benton and Computer Professionals for Social Responsibility have ample members or associates with sufficient expertise in this field to provide a valuable contribution to such a committee or working group. We will be glad to submit the credentials of such eligible candidates. We also propose that the public advocates be nominated by the public interest organizations submitting comments on this NPRM, thereby indicating their interest in this proceeding.

Respectfully submitted,

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